

An International Journal

computers & operations research

and Their Applications to Problems of World Concern

Editor: Samuel J. Raff

**List of Contents and Author Index
Volume 21, 1994**



PERGAMON

An International Journal

computers & operations research

and Their Application to Problems of World Concern

editor

Samuel J. Raff: 8312 Snug Hill Lane, Potomac, MD 20854, U.S.A.

editorial advisory board

G. Anandalingam
University of Pennsylvania

Larry M. Austin
Texas Tech University

Jonathan F. Bard
University of Texas at Austin

Oded Berman
*University of Toronto,
Canada*

Lucio Bianco
*University of Rome
"Tor Vergata", Italy*

Lawrence Bodin
University of Maryland

Israel Borovits
Tel Aviv University, Israel

R. L. Bulfin
Auburn University

Wilfred Candler
World Bank

M. L. Chaudhry
*Royal Military College of
Canada*

Sohail S. Chaudhry
Villanova University

T. C. E. Cheng
*Hong Kong Polytechnic,
Hong Kong*

James A. Chisman
Clemson University

Eng Ung Choo
*Simon Fraser University,
Canada*

Brian Conolly
*Queens College, Cambridge,
England*

Richard F. Deckro
Portland State University

John Dinkel
Texas A & M University

Moshe Dror
University of Arizona

Fred F. Easton
Syracuse University

H. A. Eiselt
*University of New Brunswick,
Canada*

E. A. Elsayed
Rutgers University

James R. Evans
University of Cincinnati

James O. Frendewey
*Michigan Technological
University*

Moshe Friedman
University of Miami

Saul Gass
University of Maryland

Bezalel Gavish
Vanderbilt University

Parviz Ghandforoush
*Virginia Polytechnic Institute
& State University*

Jay B. Ghosh
University of Dayton

Bruce Golden
University of Maryland

Jatinder N. D. Gupta
Ball State University

Cengiz Haksever
Rider College

Michael Hanna
*University of Houston—
Clear Lake*

Edward L. Hannan
*Husted Hall
Albany*

Michael Harnett
Kansas State University

John Honig
Bethesda, Md

James P. Ignizio
University of Virginia

James P. Jarvis
Clemson University

Mark H. Karwan
SUNY at Buffalo

Inder Khosla
University of Minnesota

N. K. Kwak
St Louis University

Lawrence LaForge
Clemson University

Santi Lahiri
Winchester, Mass.

Judah Lando
ELSCINT Ltd, Israel

Gilbert Laporte
*Université de Montréal,
Canada*

Richard Larson
*Massachusetts Institute of
Technology*

Cecil E. Law
*Queens University, Ontario,
Canada*

Kenneth D. Lawrence
*New Jersey Institute of
Technology*

R. C. T. Lee
*Providence University,
Taiwan*

Sang M. Lee
University of Nebraska

Reuven Levary
St Louis University

Jay Liebowitz
George Washington University

Vahid Lotfi
University of Michigan—Flint

Ben Malakooti
*Case Western Reserve
University*

Khalil Matta
University of Notre Dame

A. Mehrez
*Ben-Gurion University of the
Negev, Israel*

Hani I. Mesak
Louisiana Tech University

Laurence J. Moore
*Virginia Polytechnic Institute
& State University*

Mohamed S. A. Osman
Heliopolis, Cairo, Egypt

Hasan Pirkul
Ohio State University

Gary Reeves
University of South Carolina

Jeffrey Ringuest
Boston College

Mark Schniederjans
University of Nebraska

Anna Sciomachen
University of Milan, Italy

Jati K. Sengupta
University of California

Hanif D. Sherali
*Virginia Polytechnic Institute
& State University*

Robert T. Sumichrast
*Virginia Polytechnic Institute
& State University*

Bernard W. Taylor III
*Virginia Polytechnic Institute
& State University*

Efraim Turban
California State Long Beach

Rudolph Vetschera
*University of Konstanz,
Germany*

Ue-Pyng Wen
*National Tsing Hua University,
Taiwan*

Douglas J. White
*University of Manchester,
England*

Robert J. Willis
Monash University, Australia

E.P. Winkofsky
Zellerbach, Miamisburg

Milan Zeleny
Fordham University

Publishing Office

Elsevier Science Ltd, Bampfylde Street, Exeter EX1 2AH, England
[Tel. Exeter (01392) 51558; Fax (01392) 425370].

Production Editor: Jacqueline Turner.

Subscription and Advertising Offices

North America: Elsevier Science Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A.
Rest of the World: Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, England
[Tel. Oxford (01865) 843000; Fax (01865) 843010].

Subscription Rates

Annual Institutional Subscription Rates 1994: North, Central and South America, US\$815.00, Rest of the World £529.00. Associated Personal Subscription Rates are available on request for those whose institutions are library subscribers. Sterling prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices include postage and insurance and are subject to change without notice.

Back Issues

Back issues of all previously published volumes, in both hard copy and in microform are available direct from Elsevier Science offices.

Published monthly except June and September. Copyright © 1994 Elsevier Science Ltd

Second class postage paid at RAHWAY, NJ. Postmaster send address corrections to *Computers & Operations Research*, c/o Elsevier Science Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A.

List of Contents

NUMBER 1

John W. Chinneck	1	MINOS(IIS): infeasibility analysis using MINOS
Noel A. Bryson and Saul I. Gass	11	Solving discrete stochastic linear programs with simple recourse by the dualplex algorithm
Frits C. R. Spieksma	19	A branch-and-bound algorithm for the two- dimensional vector packing problem
V. A. Barker and Bo Friis Nielsen	27	Using program package NSPCG to analyze the trunk reservation service protection method
Amiya K. Chakravarty and Sanjoy Ghose	39	Strategic underproduction with product switching
Joanna M. Leleno	57	Adjustment process-based approach for computing a Nash-Cournot equilibrium
Hyo-Seong Lee and Sang Kuk Kim	67	Optimal dispatching of an infinite capacity shuttle with compound Poisson arrivals: control at a single terminal
Ross A. Gerrard and Richard L. Church	79	Analyzing tradeoffs between zonal constraints and accessibility in facility location
Steven E. Butt and Tom M. Cavalier	101	A heuristic for the multiple tour maximum collec- tion problem
Announcements	I	

NUMBER 2

Gen-Huey Chen and Yung-Chen Hung	113	Algorithms for the constrained quickest path problem and the enumeration of quickest paths
D. Ben-Arieh and P. T. Chang	119	An extension to the p-median group technology algorithm
Shouhong Wang and Norman P. Archer	127	A neural network technique in modeling multiple criteria multiple person decision making
Shouhong Wang	143	Neural network techniques for monotonic non- linear models
P. L. Abad	155	Supplier pricing when the buyer's annual require- ments are fixed
S. Lipovetsky and A. Tishler	169	Linear methods in multimode data analysis for decision making

- | | |
|---|---|
| Evangelos Triantaphyllou,
Allen L. Soyster and
Soundar R. T. Kumara | 185 Generating logical expressions from positive and negative examples via a branch-and-bound approach |
| Pao-long Chang,
Shiuh-nan Hwang and
Chiang Kao | 199 Some good multipliers for random number generator for 16-bit microcomputers |
| Paulo M. França,
Michel Gendreau,
Gilbert Laporte and
Felipe M. Müller | 205 A composite heuristic for the identical parallel machine scheduling problem with minimum makespan objective |
| E. A. Elsayed and
Mohammed Ettouney | 211 Perturbation analysis of linear programming problems with random parameters |

Announcements

I

NUMBER 3

- | | |
|---|---|
| Lance A. Matheson,
J. Pirie Hart and
T. D. Klastorin | 225 The optimal design of personalized bank check printing plates |
| Bezalel Gavish and
Suresh Sridhar | 239 $O(n)$ algorithms for load balancing in distributed computing systems |
| Bill C. Hardgrave,
Rick L. Wilson and
Kent A. Walstrom | 249 Predicting graduate student success: a comparison of neural networks and traditional techniques |
| J. N. Hooker, H. Yan,
I. E. Grossmann
and R. Raman | 265 Logic cuts for processing networks with fixed charges |
| Marc J. Schniederjans
and Karen D. Loch | 281 An aid for strategic marketing in the banking industry: a Markov analysis |
| Surendra M. Gupta and
Emanuel Melachrinoudis | 289 Complementarity and equivalence in finite source queueing models with spares |
| Sushant Jain and
J. MacGregor Smith | 297 Open finite queueing networks with $M/M/C/K$ parallel servers |
| Han-Lin Li | 319 A new global approach for 0-1 polynomial programs |
| Adam Fadlalla, James R. Evans
and Martin S. Levy | 329 A greedy heuristic for the mean tardiness sequencing problem |
| Gölgen Bengü and
Juan Carlos Ortiz | 337 Telecommunications systems maintenance |
| Kao-Chêng Lin and
Maw-Sheng Chern | 353 The single most vital arc in the most economical path problem—a parametric analysis |

NUMBER 4

- | | | |
|--|-----|---|
| Brian Borchers
and John E. Mitchell | 359 | An improved branch and bound algorithm for mixed integer nonlinear programs |
| Yong Sun Choi and
Soung Hie Kim | 369 | An improved multiple criteria visual interactive method with stepwise focused contouring of efficient criterion vectors |
| Layek Abdel-Malek and
Chi Tang | 385 | A heuristic for cyclic stochastic sequencing of tasks on a drum-like storage system |
| T. Yamada, J. Yoruzuya
and S. Kataoka | 397 | Enumerating extreme points of a highly degenerate polytope |
| Tej S. Dhakar,
Charles P. Schmidt and
David M. Miller | 411 | Base stock level determination for high cost low demand critical repairable spares |
| Kemal Altinkemer | 421 | Topological design of ring networks |
| Ami Arbel | 433 | A multiobjective interior primal-dual linear programming algorithm |
| Yuemin Ding, Alok Baveja
and Rajan Batta | 447 | Implementing Larson and Sadiq's location model in a geographic information system |
| Stephen M. Hart and
Chuen-Lung S. Chen | 455 | Simulated annealing and the mapping problem: a computational study |
| Hong-Chieh Chou and
Chung-Ping Chung | 463 | Optimal multiprocessor task scheduling using dominance and equivalence relations |

NUMBER 5

- | | | |
|--|-----|---|
| V. Sridharan and
R. Lawrence LaForge | 477 | A model to estimate service levels when a portion of the master production schedule is frozen |
| Ahmet Bolat,
Mehmet Savsar and
Mohammed A. Al-Fawzan | 487 | Algorithms for real-time scheduling of jobs on mixed model assembly lines |
| X. Cai and C. J. Goh | 499 | A fast heuristic for the train scheduling problem |
| Jianzhong Zhang and
Dan Sha | 511 | A priority measure in interval methods for constrained global optimization |
| Jeffrey L. Riggs,
Sheila B. Brown and
Robert P. Trueblood | 521 | Integration of technical, cost, and schedule risks in project management |
| William Hurley | 535 | Adjacent vertex simplex algorithms: more experimental results on random problems |

Zilla Sinuany-Stern, Abraham Mehrez and Arieh Barboy	543	Academic departments efficiency via DEA
Oded Berman and Zvi Ganz	557	The capacity expansion problem in the service industry
Katherine J. Toussaint and Bruce L. Golden	573	Exchange heuristics to improve the clarity of base/time plots
Joaquim J. Júdice and Fernanda M. Pires	587	A block principal pivoting algorithm for large-scale strictly monotone linear complementarity problems
Announcements	I	

NUMBER 6

U. C. Gupta and T. S. S. Srinivasa Rao	597	A recursive method to compute the steady state probabilities of the machine interference model: (M/G/1)/K
William E. Stein and Murray J. Côté	607	Scheduling arrivals to a queue
N. K. Jaiswal and B. S. Nagabhushana	615	Combat modeling with spatial effects, reserve deployment and termination decision rules
Stuart L. Harshbarger and Vladimir A. Greenberg	629	Utility least cost planning and the Washington gas integrated model
Wen Lea Pearn and Mao Lin Li	641	Algorithms for the Windy Postman Problem
Gur Mosheiov	653	Scheduling jobs under simple linear deterioration
Hamidreza Amindavar, James A. Ritcey and Arun K. Somani	661	Analytical computation of Markov chain using Padé approximations
John J. Bernardo and Kun-Si Lin	677	An interactive procedure for bi-criteria production scheduling
F. Harche and G. L. Thompson	689	The column subtraction algorithm: an exact method for solving weighted set covering, packing and partitioning problems
Abraham P. Punnen	707	On combined minmax-minsum optimization
Announcements	I	

NUMBER 7

T. C. E. Cheng, Z.-L. Chen and C. Oguz	717	One-machine batching and sequencing of multiple-type items
---	------------	---

Francis J. Nourie and Faruk Güder	723	A restricted-entry method for a transportation problem with piecewise-linear concave costs
Robert C. Soltysik and Paul R. Yarnold	735	The Warmack-Gonzalez algorithm for linear two-category multivariable optimal discriminant analysis
Yaw O. Chang and John K. Karlof	747	Large scale geometric programming: an application in coding theory
Steven T. Breslawski and Stanley Zionts	757	A simulation based study of modifications to the Zionts-Wallenius algorithm for multiple objective linear programming
C. S. Sung and B. K. Yoo	769	Parametric max flow problems in a class of networks with series-parallel structure
Kurt M. Bretthauer and A. Victor Cabot	777	A composite branch and bound, cutting plane algorithm for concave minimization over a polyhedron
B. V. Cadambi	787	One machine scheduling to minimize expected mean tardiness—Part II
Announcements	I	

NUMBER 8

HEURISTIC, GENETIC AND TABU SEARCH

Samuel J. Raff	797	Preface
S. Selcuk Erenguc and Hasan Pirkul	799	Foreword
Fred Glover	801	Optimization by ghost image processes in neural networks
David L. Woodruff	823	Simulated annealing and tabu search: lessons from a line search
Oya Icmeli and S. Selcuk Erenguc	841	A tabu search procedure for the resource constrained project scheduling problem with discounted cash flows
Jadranka Skorin-Kapov	855	Extensions of a tabu search adaptation to the Quadratic Assignment Problem
John Knox	867	Tabu search performance on the symmetric traveling salesman problem
Roland Hübscher and Fred Glover	877	Applying tabu search with influential diversification to multiprocessor scheduling

James P. Kelly, Manuel Laguna and Fred Glover	885	A study of diversification strategies for the quadratic assignment problem
Hasan Pirkul and Erik Rolland	895	New heuristic solution procedures for the uniform graph partitioning problem: extensions and evaluation
Haldun Aytug, Gary J. Koehler and Jane L. Snowdon	909	Genetic learning of dynamic scheduling within a simulation environment
Anna-Lena Nordström and Sullyman Tufekci	927	A genetic algorithm for the talent scheduling problem
S. Yeralan and C.-S. Lin	941	Genetic search with dynamic operating disciplines
Daniel G. Conway and M. A. Venkataramanan	955	Genetic search and the dynamic facility layout problem

NUMBER 9

Clark Jeffries and Tim Niznik	961	Easing the conscience of the guilty net
I. M. Premachandra and Liliana Gonzalez	969	An exact solution to a class of queueing systems with multipurpose counters
C. E. Love and K. F. Lam	979	Classifying and controlling errors in forecasting using multiple criteria goal programming
Jun Wang	991	A neural network approach to modeling fuzzy preference relations for multiple criteria decision making
Stephen E. Bechtold* and Michael J. Brusco	1001	A microcomputer-based heuristic for tour scheduling of a mixed workforce
Won J. Lee, A. Victor Cabot and M. A. Venkataramanan	1011	A branch and bound algorithm for solving separable convex integer programming problems
Bruno-Laurent Garcia, Jean-Yves Potvin and Jean-Marc Rousseau	1025	A parallel implementation of the Tabu search heuristic for vehicle routing problems with time window constraints
<i>Technical Note</i>		
Chiang Kao and J. Y. Wong	1035	Several extensively tested random number generators

Announcements

I

NUMBER 10

Weizhen Mao and Rex K. Kincaid	1041	A look-ahead heuristic for scheduling jobs with release dates on a single machine
---	------	---

Norman D. Curet	1051	An incremental primal-dual method for generalized networks
Ely Merzbach and Boris Singer	1061	How to construct a partition when preference sets are given
L. G. Proll and A. Salhi	1069	A note on a maximum distance problem
Cheryl Gaimon and Johnny C. Ho	1073	Uncertainty and the acquisition of capacity: a competitive analysis
Chiang Kao	1089	Decomposition with simulated division for efficiently generating random numbers
Ching-Jong Liao	1095	A new node selection strategy in the branch-and-bound procedure
Erhan Erkut, Yılmaz Ülküsal and Oktay Yeniçerioğlu	1103	A comparison of p -dispersion heuristics
John R. Gum and James A. Chisman	1115	An Operations Research Information System (ORIS)
Announcements	I	

